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THE UNIVERSITY OF ALBERTA
AN APPLICATION OF THE RESOURCE REQUIREMENTS
PREDICTION MODEL TO A SMALL ALBERTA SCHOOL:
GRADES 1 TO 12

by



ANTHONY ROBERT ALFRED MARSHALL

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ABSTRACT

The Resource Requirements Prediction Model (RRPM) was designed as an instructional cost simulation model for post-secondary institutions. Experience with applying the model to a community college suggested that the RRPM was sufficiently flexible to be applicable to a school. The purpose of this study was to determine whether the model could be used to simulate a school and the usefulness of such an application. Version 1.6, of the RRPM, was used exclusively in this study.

The school to be used in the study was selected on the basis of four criteria: 1. that the school be small enough to facilitate data collection; 2. that there be a range of grades; 3. that there be diversity in senior high school programs; and 4. that the school administration be cognizant of management techniques.

Staff work summaries, obtained from the school, provided information on staff work loads, class sizes, and the duration of classes. Student data, also obtained from the school, included grade level and courses taken. Information on expenditures other than salaries, was obtained from both the county office and the principal. The county office also provided staff salary data.

The data were used to model the school in five applications of the RRPM 1.6. The parameters required for

the simulation of the school were derived from these same data. Following the development of a satisfactory model of the school, the principal was consulted for the purpose of obtaining enrolment projections, and other information, to provide a basis for a variety of simulations. These simulations included a time-series prediction of annual expenditures to 1980/81. In addition, a number of changes to the school, suggested in discussion with the principal, were simulated.

The accuracy, with which the RRPM 1.6 simulated the school, was determined by comparing the values calculated by the model with those derived directly from raw data. The usefulness of applying the RRPM was assessed by interviewing the principal and superintendent of schools to determine their opinions.

While the model accurately simulated the current operation of the school, other simulations were suspect since the model did not accurately represent the relationship between enrolments and number of FTE faculty. The information reported by the RRPM 1.6 was found to be highly relevant to decision-making at the county level but less so in the school. The reduced usefulness at the school level, was a consequence of the level of aggregation necessary to provide a stable base for prediction, i.e., insufficient detail was provided.

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Chapter 1

STATEMENT OF THE PROBLEM AND ITS SIGNIFICANCE

This chapter contains four sections. The first of these provides some information on the development of the Resource Requirements Prediction Model and on the background to this study. The second section contains a statement of the problem investigated and the sub-problems implicit in that problem. The third section provides some definitions relevant to a discussion of the function and nature of the model as an administrative tool while the final section outlines the organization of the thesis and includes a summary of Chapter 1.

INTRODUCTION

The Resource Requirements Prediction Model (RRPM), version 1.6, was designed as an instructional cost simulation model for post-secondary institutions (Clark et al., 1972:1). The model consists of a set of six computer programs which accept certain data and generate reports which provide cost-analytic data for use in administrative decision-making.

Development of the Model

The RRPM was developed at the National Center for

Higher Educational Management Systems (NCHEMS) at The Western Interstate Commission for Higher Education (WICHE) over a period of several years. The current version, number 1.6, of the RRPM was released in December of 1972 and is an evolutionary product based on experiences with previous NCHEMS products, specifically RRPM 1.3 and the Cost Estimation Model (Clark et al., 1972:1).

Background of the Study

Certain faculty members of the Department of Educational Administration of the University of Alberta, viz., Dr. D.M. Richards and Dr. E. Seger, directed a project which included the application of the RRPM 1.3 to a community college. On the basis of their experiences with this project they felt that the RRPM was sufficiently flexible to be potentially applicable to a school. From their belief this study originated.

STATEMENT OF THE PROBLEM

The problem in this study arises from the potential for application to a school due to the flexibility of the RRPM 1.6. The problem is two-fold, being concerned firstly with the extent to which the RRPM 1.6 can model and simulate a school, and secondly with the value of its use.

The Problem

The problem being investigated in this study can be expressed in the form of a question:

Can the RRPM 1.6 be usefully applied to a school?

However the statement of the problem in the form of a single question does not provide a useful basis for investigation. Analysis of the question suggests a number of sub-problems which form the basis for this study.

Sub-Problems

The sub-problems selected for investigation in this study are represented by the questions enumerated below.

1. Can the RRPM 1.6 be used to model a school?
2. Can the RRPM 1.6 be used to simulate a school?
3. How useful is the RRPM 1.6, as a tool for administrative decision-making at different levels of organization?

SIGNIFICANCE OF THE PROBLEM

Carpenter and Haggert (1970:28) suggest that resource allocation problems can be handled most easily and consistently where a resource/cost model of the district has been developed. Such a model would comprise a set of mathematical expressions that relate parameters,

describing the district and the programs, to estimates of costs and resource requirements. The advantage of such a model is (Carpenter and Haggert, 1970:28) that the analyst can formulate a description of the district at each future date and simulate the results of conducting each alternative program within the district. If the RRPM 1.6 were to prove sufficiently flexible to adequately model and simulate a school then its implementation in all schools in a district would provide a resource/cost allocation model with the advantages mentioned above.

DEFINITIONS

Certain terms will be used throughout the thesis in describing the function or use of the model. The definitions which follow are not only intended to minimize semantic difficulties but also to place the model in context. These definitions should both assist in understanding the model and provide a basis for its evaluation.

Cost Analysis

The literature related to cost analysis has been extensively reviewed in a number of recent theses (Fennel, 1972; Meek, 1972; Purkess, 1971), which are available if additional information is required. For the

purposes of this study a general definition is most useful. Hull (1961:732) suggests that cost analysis attempts " . . . to allocate measurable costs to predetermined units for a given period of time." A general definition is most appropriate for the purposes of this study since both the costs which can be accounted for and the units to which those costs can be allocated, are determined by the model. Witner (1967:1) identifies some potential units to which resources may be allocated, viz., a contact period, credit, a major program, course or student, most of which are used in the RRPM 1.6.

Models, Modelling, and Simulation

Stallard (1970:12) uses the term "model" to represent a set of abstract relationships that are analogous to relationships perceived or conceived to be of the real world. He qualifies this definition by limiting the relationships considered to those which are most important, significant, or relevant to the purpose of the model. This definition is supported by Chestnut (1965:108) who defines a model as a " . . . qualitative or quantitative representation of a process or endeavour that shows the effects of those factors which are significant for the purposes being considered." Where the relationships are mathematical in nature the model may be

categorized as a mathematical model of which the RRPM 1.6 is an example.

Modelling is the process or system while simulation determines how the process or system will react to various conditions or situations it may encounter (Chestnut, 1965:107). In terms of the RRPM 1.6 the modelling phase consists of defining organizational characteristics, in terms appropriate to the model, and the various mathematical relationships that the model can represent. The simulation phase involves the calculation of the parameters required by the RRPM 1.6 and the analysis of the reports generated.

ORGANIZATION OF THE THESIS

Chapters 1, 3 and 4 are directly concerned with the research process while chapter 2 introduces the RRPM. The remaining chapter provides a summary of the investigation together with some comments based on the experience gained in carrying out the study.

Summary of Chapter 1

The RRPM 1.6 is a computer based instructional cost simulation model which is sufficiently flexible to be potentially applicable to a school. This potential raises questions related to the possibility of applying the model

to a school and the usefulness of such an application. The problem to be investigated is expressed in the form of three questions covering these two areas.

A number of terms used in discussing the RRPM are defined to minimize semantic difficulties, i.e., cost analysis, model, modelling, and simulation.

Succeeding Chapters

Chapter 2 provides an overview of the RRPM 1.6. After a general introduction the chapter continues with a discussion of the types of data used by the model and their application to a school. The research design is discussed in chapter 3 while the analytic procedures used, together with the findings are described in chapter 4. Chapter 5 provides a summary of the findings together with a statement of conclusions, implications, and suggestions for further research.

Chapter 2

THE RESOURCE REQUIREMENTS PREDICTION MODEL

This chapter provides an introduction to the Resource Requirements Prediction Model (RRPM), version 1.6, and an outline of its intended use. The second section consists of a discussion of the types of data used in applying the RRPM 1.6 to a school. One focus of this discussion is the number of options available for defining the data in terms appropriate to a school. The third section describes the data contained in the reports generated by the model, while the final section of the chapter summarizes the problems arising from the application, to a school, of a model designed for post-secondary institutions.

INTRODUCTION TO THE RRPM 1.6

The Resource Requirements Prediction Model (RRPM), version 1.6, consists of six computer programs written in the COBOL programming language. These programs accept various institutional parameters and the mathematical relationships between certain of these parameters. Using these parameters and relationships, together with other mathematical relationships fixed by the model, the

programs control the calculation of various unit costs and planning parameters, and the generation of a set of reports detailing these.

USE OF THE MODEL

The first phase in the implementation of the RRPM 1.6 is to collect the raw data. The second phase is to decide on definitions, appropriate to the institution, of terms used by the model. The third phase is the calculation of the institutional parameters required by the model, using definitions decided upon. Using these parameters the school is then simulated for the purpose of validating the model, by comparing variables calculated by the RRPM 1.6 with actual values. The data set consisting of both input and calculated data is termed an "iteration." Having developed a validated model for the particular institution, simulations are now possible.

Once a base iteration has been calculated, simulation of changes in the institution is possible. The modifications of institutional parameters necessary to effect the change being simulated, are used by the model to calculate the values of variables representing the effect of the simulated change. A series of reports may then be generated from the data of this new iteration.

An awareness of the deterministic nature of the

RRPM 1.6 is essential for correct interpretation of the reports. As a consequence of the deterministic nature of the model, the reports represent what will actually occur should the input data and mathematical relationships accurately represent reality. Meaningful interpretation of the reports is thus dependent upon a knowledge of the accuracy of the input data and the validity of the model.

INPUT DATA

Many of the terms used to describe the input data required by the RRPM 1.6 are couched in terms more appropriate to post-secondary institutions. This is a natural consequence of the intent of the developers to provide a model for such institutions. However considerable flexibility is available in the definitions which may be used with the terms and in some cases renaming is possible. In the remainder of this section each type of datum is discussed in relation to a school. Information on these data is contained in an introduction to the RRPM 1.6 (Clark et al., 1972) which is part of the documentation of the model. In this discussion the terms "parameter" and "variable" have specific referents.

In the context of this study the term parameter is taken to mean either a property of the institution, the value of which is derived from raw data, or the value of

such a property. The term variable will be used to mean a property of the institution, the value of which is calculated by the RRPM 1.6. Thus the same property may be a parameter in one situation and a variable in another.

Definitions

Seven possible definitions may be provided. They are: organizational levels; course levels; student levels; instruction types; faculty ranks; staff categories; and other expense types. If definitions are not provided the RRPM 1.6 will provide meaningful identifiers.

Organizational levels. A maximum of three organizational levels may be defined. If no definitions are provided they will be called discipline, department, and school. The institution may be described as having a number of "schools" each of which consists of a number of "departments" each made up of a number of "disciplines." The RRPM 1.6 calculates data for the units of the lowest level of aggregation, the disciplines, which are then aggregated to produce data for the next level, the departments, which are in turn aggregated to produce data for each school. A final aggregation of data for the schools produces data for the institution as a unit.

The nature of the raw data required for the implementation of the model is not affected by decisions

concerning the number and definition of organizational levels to be used, since any definition requires data on individual courses. The level of organization which will be defined as the lowest level for use with the RRPM 1.6 will be decided by considerations of the stability of that level over time. An illustrative example is that although individual courses may be defined in the lowest organizational level, it is unlikely that such characteristics as class size and the teachers' relative salaries would be stable from one year to the next.

Course levels. Up to seven course levels may be defined for the institution. If the model were to be applied to either an elementary school or a high school then there would be no problems in defining the course levels--each course level would correspond to one grade. However the application of the RRPM 1.6 to a school of 12 grades requires the grouping of grade levels into a maximum of seven categories.

Student levels. A maximum of seven student levels may be defined for each program. Programs may be defined such that the number of student levels in each does not exceed seven. However the RRPM 1.6 provides for an average cost per student for each student level and across all programs. The excess of grade levels over student

levels does not allow one to one correspondence between the two thus rendering meaningless the averages of cost per student across programs. This feature of the model could be used by grouping the 12 grades into a maximum of seven categories.

Instruction types. The RRPM 1.6 allows the definition of up to five instruction types. This feature permits the distinction between types of instruction which differ in characteristics affecting such unit costs as cost per student and cost per credit. An example of this type of difference is laboratory instruction with its smaller class sizes and higher direct instructional expenses than conventional classroom instruction. The effect of these differences would be a higher cost per student and cost per credit in laboratory instruction.

Faculty ranks. The maximum of six faculty ranks available is appropriate to a post-secondary institution where a hierarchy is readily identifiable and a small number of salaries make up the faculty salary schedule. In a university the six ranks may be defined as professor, associate professor, assistant professor, instructor, teaching assistant, and other. For each rank an average salary could be readily determined.

A formal hierarchy of teachers in a school is not

readily identifiable but must be constructed on the basis of salary. The salary schedule for a school could be expected to consist of more steps than that for a post-secondary institution. Thus for use with the model, the salaries in a school could be represented by grouping them into a maximum of six categories. Each teacher could then be assigned a rank corresponding to the category which includes his salary.

Staff categories. The RRPM 1.6 permits the definition of titles for up to four types of non-teaching support staff assigned to teaching departments, e.g., secretary, laboratory assistant, student help.

Other expense types. Apart from salaries, a maximum of seven types of direct instructional expense may be defined. These expenses should include all types of expenditure by instructional departments, e.g., supplies, equipment, telephone, travel, printing, rentals, miscellaneous.

Titles

Titles of organizational structures must be supplied together with information on the hierarchical relationships between the organizational levels. The model displays these titles in its report.

Field of study titles. A field of study may be a degree program, vocational program, field of interest, or represented by the courses undertaken by any group of students who might logically be viewed as a homogeneous group for the purposes of analysis. The range of grade levels, which can be included in a group with a common field of study, is restricted by the upper limit of seven student levels.

Discipline titles. A title must be provided for each unit at the lowest organizational level--number 1. The organizational units of level 1 are the cost centres which become the basis for calculating the unit cost (e.g., cost per credit hour) and the average cost per student. Although the units of organizational level 1 are initially termed "disciplines" they may be renamed to conform with usage in the institution being modelled.

Department titles. Data from the disciplines may be aggregated during the preparation of reports. If such aggregation is desired titles must be supplied for each "department" together with data on the way in which disciplines are to be aggregated to form departments. Although units of organizational level 2 are termed "departments" they may be renamed.

School titles. Yet a third level of aggregation is available in the model for the preparation of reports. If this option is used then titles must be supplied for each "school" together with data linking units of organizational level 2, departments, to particular "schools." As with the lower organizational levels the third level may also be renamed.

Induced Course Load Matrix (ICLM)

Clark et al (1972:9) describes the ICLM in its simplest form as the average number of units taken by a typical student in each program, or field of study, from each discipline or department. The credit hour is the most common unit of measure (Clarke et al., 1972:10) and is the only unit considered in this study. Other units which might be used are contact hours, courses, or subjects.

Enrolment

The number of students enrolled in each student level of every program must be supplied to the model.

Faculty Salary Schedule

The salary corresponding to each faculty rank must be supplied for each discipline. These data are used, together with the calculated number of full time equivalent (FTE) faculty of each rank, to compute the

salary costs by discipline, course level, and faculty rank.

Ratio of Student Contact Hours to Student Credit Hours

This ratio establishes the relationship between the number of hours students spend in the classroom and the number of credit hours earned. If one credit were defined as forty minutes of instruction per week for the whole academic year then the ratio of contact hours to credit hours would be 0.67.

Distribution of Student Contact Hours

The RRPM 1.6 uses the enrolment and ICLM data to calculate the total number of student contact hours which must be produced by each discipline at each course level. The proration of costs to different types of instruction requires data on the distribution of student contact hours across the different instruction types. The proportions of instruction types must be provided for each course level of every discipline.

Class Size

The average class size must be provided for each instruction type for all course levels of every discipline.

Faculty Work Load

The number of contact hours per week of the typical faculty member must be provided for each instruction type for all course levels of every discipline.

Faculty Rank Distribution

The RRPM 1.6 requires the proportion of each faculty rank teaching each instruction type at each course level of every discipline. These data are used in the proration of faculty salary costs to instruction types and course levels.

Chairman and Chairman's Salary

In terms of the RRPM 1.6, the position of department head in a school corresponds to that of a chairman in a post-secondary institution. The data required to determine department head's administrative costs, are the proportion of his time allocated to administration, and his salary. An additional datum required is the basis on which these costs are to be allocated to course levels, i.e., FTE faculty, faculty salaries, student credit hours, or a specific course level.

Number of Support Staff

The number of support staff assigned to a discipline may be input as a constant, and/or as a function of any or all of FTE faculty, credit hours, and FTE chairman. In addition the average salary for each staff category must be supplied.

"Other" Discipline Expenses

Other expenses of each instructional discipline are calculated by means of estimating equations. These expenditures may be input as a constant, and/or as a function of any or all of total FTE faculty, total support staff, FTE chairman, student credit hours, total faculty salaries, and total staff salaries. The basis for allocation of these costs to a course level must be provided, i.e., faculty salaries, FTE faculty, student credit hours, or a specific course level.

Costs of Other than General Academic Instruction

If costs of other than direct instruction can be identified with specific discipline and course level cost centres, the model can accommodate the allocation of such costs to the appropriate cost centres. These costs must be calculated external to the model.

Non-Instructional Expense Estimating Equations

The model uses a series of estimating equations to calculate the cost of organizational activities other than general academic instruction. Each cost may be input as a constant, and/or as a function of any or all of enrolment, student credit hours, FTE faculty, FTE staff, total faculty salaries, total staff salaries, and the total instructional budget. Each activity other than direct instruction may be described by the construction of a series of estimating equations.

CUTPUT DATA

Data for use in decision-making are provided by the RRPM 1.6 in the form of three types of reports. All or any of these reports may be obtained with the level of aggregation specified by the user.

The Organizational Budget

The organizational budget consists of a series of reports on the units at the different organizational levels. Each report provides line-item budgets detailing the personnel and dollar requirements for the organizational units at the level of aggregation specified. (A sample of this report format is included in Appendix 1).

Personnel data. For each faculty rank the salary, number of FTE faculty, and a total cost are reported. In addition a weighted average salary of all ranks is calculated and presented along with the total number of FTE and cost for the unit. Data are also provided on the distribution of staff and their salaries.

Other discipline expenses. The discipline expenses calculated by the model are displayed along with the appropriate titles. Other discipline expenses calculated externally to the model are listed as additional expenses.

Unit cost data. The distribution, over course levels, of the costs discussed in the previous two paragraphs, produces the unit costs. Values reported for each course level are total cost, number of credit hours produced, and cost per credit hour.

The Program Budget

The second type of report shows the budget for each program, the number of students enrolled in the program, the cost per student, and the total cost of each program.

The Institutional Summary

The institutional summary displays the

expenditures of the various institutional activities, e.g., general academic instruction, library, physical plant operation and maintenance.

SUMMARY

Following the collection of raw data on the institution a number of definitions must be decided upon, e.g., program, lowest level organizational unit, student level, and course level. Based on student data, an induced course load matrix is then calculated. To allow the model to determine numbers of FTE faculty and faculty salary costs, data are required on faculty salary, ratio of student contact hours to student credit hours, distribution of student contact hours across instruction types, class size, faculty work load, and faculty rank distribution. Additional data required are number of FTE allocated to departmental administration, the chairman's salary, the number of support staff, and other expenses and costs. Particular problems in applying the model to a school are due to the restriction of the number of both student and course levels to a maximum of seven.

Based on the data outlined above, the RRPM 1.6 calculates values for the variables of each organizational unit. These include the number of FTE of each faculty rank, the cost of faculty salaries, other expenses, the

total cost of each course level, and the cost per credit hour for each course level. Values displayed for each program include total cost, cost per student, and total enrolment in the program. The third report type shows a breakdown of the expenditures for the various activities carried out by the institution.

Chapter 3

RESEARCH DESIGN

The chapter commences with an outline of the study and a discussion of the limitations and delimitations. Following this is a consideration of the criteria for selection of the school to be used in the study. Data sources and collection are then described followed by a description of how the data were treated to produce the parameters required by the RRPM 1.6.

INTRODUCTION

This investigation was intended as a pilot study to provide information which would assist in further considerations of the appropriateness of the RRPM 1.6 as a cost analytic tool for use in schools. In this context the county office of education was not involved to any great extent. The implementation of the RRPM 1.6 as a working administrative tool requires an extensive project involving administrators at all levels.

OUTLINE OF THE STUDY

After the school had been selected, permission was obtained from the superintendent to conduct the study.

Data on the organization of the school and internal expenditures were obtained from school records and by interview with the principal, other expenditure data were obtained from the county office. The raw data were then converted to the form required by the RPPM 1.6 and the model applied to the school in a number of different ways. The reports generated were evaluated, in consultation with the principal, to select the most appropriate basis for modelling the school. Data were then obtained on enrolment projections, expenditure trends, and possible heuristic applications of the model.

Based on the agreed enrolment projections and expenditure trends, a number of reports were generated which predicted expenditures for the next eight years. The potential heuristic applications, discussed with the principal, were used as the basis for generating another set of reports predicting the effect of given parameter changes on expenditure. All reports were then discussed with the principal and the superintendent of schools, for the purpose of evaluating the applicability of the model to the school.

LIMITATIONS AND DELIMITATIONS

Contact, with the administrative personnel of the school district, was limited mainly to the school

principal for two reasons: the cognizance by the principal of management techniques; and the preliminary nature of this study, which could not be afforded the extensive time commitment that would be required for a full scale project leading to the implementation of the model.

The accuracy with which the RRPM 1.6 simulated the school was evaluated on an objective basis. The utility of applying the model was evaluated on the basis of the opinions of those involved in its application, i.e., the school principal, the superintendent of schools, and the investigator. The justification for limiting the number of people involved in this subjective evaluation is that in view of the preliminary nature of this study, sufficient information would be available from the experiences of these people to indicate whether or not further investigation into the application of the RRPM 1.6 to schools, would be worthwhile.

SELECTION OF THE SCHOOL

The criteria for selection of an appropriate school were:

1. that the school be small enough to facilitate data collection;
2. that there be a range of grades;
3. that there be diversity in the senior high school

programs; and

4. that the school administration be cognizant of management techniques.

DATA COLLECTION

Data were obtained from both the school and the county office, the latter producing information concerning salaries and physical plant maintenance and operation costs. Student data obtained from the school showed the enrolment in each program and the courses taken by each student. Staff work load summaries obtained from the school gave the size and duration of each class taught together with any non-teaching duties.

The school accounts were organized in the traditional manner and showed expenditures, other than those on salaries and physical plant maintenance and operation, of different types for different subject areas although not the grade level generating the expenditures. This organization concealed the relationship between expenditure and programs.

DATA TREATMENT

The various concepts used in the RRPM 1.6 required definition, in terms appropriate to the school, before the parameters required by the model could be calculated from

the raw data. Parameters which were calculated included class size, distribution of instruction at each course level over faculty ranks and instruction types, and the induced course load matrix. These data were available from the staff work load summaries obtained from the school.

SUMMARY

Involvement of the administrative personnel of the school district was confined largely to the principal due to the preliminary nature of the study. The raw data obtained from both school and county records and by interview with the principal were then used as a basis for four simulations. The principal was interviewed to determine which was the most appropriate simulation. Data for experimental use of the model were obtained at this same interview. After these data had been used with the model, the principal was again interviewed for the purpose of assessing the value of applying the RRPM 1.6 to a school.

The school was selected on the basis of size, grade range, diversity in senior high school programs, and cognizance by the administration of management techniques.

Data were collected by interviewing the principal and consulting school and county records. The school was

then defined in terms compatible with the model and the simulation parameters derived.

Chapter 4

ANALYSIS AND FINDINGS

The conformity of the school to the selection criteria is examined. This is followed by three sections, each centred around one of the research questions posed earlier:

1. Can the RRPM 1.6 be used to model the school?
2. Can the RRPM 1.6 be used to simulate the school?
3. Is the RRPM 1.6 useful as an administrative tool?

Each section of the chapter will consist of the analysis and findings related to the particular research question being considered. A concluding summary will follow the third section.

SELECTION OF THE SCHOOL

Criteria for selection of an appropriate school were outlined in chapter 3. The school met the first criterion in that the enrolment was appropriately small, 300 students. Standard and optional academic courses were offered together with vocational courses, thus providing diversity in the programs offered at the senior high school level. The principal had obtained the degree of Master of Education, from the Department of Educational

Administration at The University of Alberta, thus meeting the criterion of cognizance by the school administration of management techniques.

CAN THE RRPM 1.6 BE USED TO MODEL A SCHOOL?

This question can best be answered by considering the input and output data separately. The input data consist of definiticns of organizational units together with relationships defined from raw data. The output is in the form of the various unit costs and planning parameters calculated by the RRPM 1.6. With both input and output data there are two aspects of evaluation. The first aspect is the extent to which the concepts defined in the model represent the actual relationships in the school. The second is the accuracy with which the parameters calculated by hand from raw data agree with the variates calculated by the RRPM 1.6.

The extent to which the concepts used in the RRPM 1.6 are applicable to a school was studied by using a variety of definitions in four applications of the model. These applications provided the basis for the evaluation, by consensus of opinion in discussion with the principal, of the validity of the model. Modifications suggested during this discussion were incorporated into a final application--Base Year 1972/73--which was used as the

basis for a variety of simulations.

The following sections of the chapter outline the way in which the school was modelled in each of the applications of the RRPM 1.6. Applications after the first were based on the experience gained from preceding applications. The modifications to those preceding applications are described in the sections dealing with the second, third, and fourth applications.

First Application of the RRPM 1.6

In the first application of the RRPM 1.6 the main focus was on defining the school in terms compatible with the model, and deriving the relationships and parameters needed to model the school. The object of this application was to provide a basis for subsequent, more sophisticated applications. The definition of organizational characteristics and the derivation of the necessary parameters are discussed in the following paragraphs.

Organizational levels. Twenty-four "departments" were defined (Table 1), each being a logically identifiable, coherent, organizational unit which offered instruction. These were grouped into four "divisions"--Primary, Elementary, Junior High, Senior High--depending on whether they offered courses to only

Table 1

Organizational Units Defined in the First Application
of the RRPM 1.6: Titles and Relationships

=====

Primary Division

General Primary Department
Primary Music Department

Elementary Division

General Elementary Department
Elementary Music Department
Elementary Physical Education Department

Junior High Division

Junior Language Arts Department
Junior Social Science Department
Junior Science Department
Junior Mathematics Department
Junior Physical Education Department
Junior Home Economics Department
Junior Industrial Arts Department
Junior Music Department
Guidance Department

Senior High Division

Senior Language Arts Department
Senior Social Science Department
Senior Science Department
Senior Mathematics Department
Senior Physical Education Department
Senior Home Economics Department
Senior Industrial Arts Department
Second Language Department
Business Education Department
Fine Arts Department

=====

grades 1-3, 4-6, 7-9, or 10-12 respectively.

Course levels. Only three course levels were used of the maximum seven permitted by the RRPM 1.6. The same three course levels were defined differently for the four divisions (Table 2). Since each course level represented a different grade level in each division, any data aggregated on the basis of course levels were meaningless, e.g., course level-01 represented grades 1, 4, 7, and 10.

Student levels and programs. Only student level-01 was used as a result of the way in which programs were defined. Nine programs were defined to represent the courses taken by students in grades 1-9 respectively. A further six programs were defined to accommodate students in grades 10-12 who were categorized as either senior matriculation or high school diploma students. The titles of these fifteen programs are displayed in Table 3. The definition of fifteen programs, each with one student level, permitted the calculation of the per student cost at every grade level and even in categories within grade levels, e.g., matriculation and non-matriculation students in the senior high school. The weighted average for the one student level, over the whole institution, represented the average cost per student in the school.

Table 2

Course Levels Defined in the First Application
of the RRPM 1.6: Corresponding Grade Levels.

Division	Course Level		
	1 (grade)	2 (grade)	3 (grade)
Primary	1	2	3
Elementary	4	5	6
Junior High	7	8	9
Senior High	10	11	12

Table 3

Titles of the Programs Defined in the First Application
of the RRPM 1.6.

Grade One	Grade Ten Matriculation
Grade Two	Grade Eleven Matriculation
Grade Three	Grade Twelve Matriculation
Grade Four	Grade Ten Diploma
Grade Five	Grade Eleven Diploma
Grade Six	Grade Twelve Diploma
Grade Seven	
Grade Eight	
Grade Nine	

Instruction types. While cost data are not reported by instruction type the RRPM 1.6 provides for the definition of up to five types. This option was designed to distinguish between instruction types with different resource requirement characteristics, e.g., industrial arts instruction--with smaller class sizes and greater equipment expenses--may be distinguished from normal classroom instruction. In the school being studied no such distinctions were normally made. However a distinction, between classroom instruction and instruction using the gymnasium, was made in the physical education departments for the purpose of demonstrating the capabilities of the RRPM 1.6.

Faculty ranks and salaries. The RRPM 1.6 requires the categorization of the faculty in each department, on the basis of salary, into a maximum of six faculty ranks. In this application of the RRPM 1.6 the teachers in each department were ranked on the basis of salary with the highest salaried teacher being assigned a rank of one (Table 4). Data calculated using this definition were meaningful for each department but not when departmental data were aggregated to produce divisional data.

Other expense types. Six of the possible seven categories of direct instructional expenditure, allowed by

Table 4

Salaries Associated with the Faculty Ranks Defined
in the First Application of the RRPm 1.6.

Department	Faculty Rank					
	1	2	3	4	5	6
	\$	\$	\$	\$	\$	\$
General Primary	9340	9170	9000	7750		
Primary Music	8600					
General Elementary	9000	7755				
Elementary Music	8600					
Elem. Phys. Ed.	9000	8482	7760			
Jun. Lang. Arts	12531	9569	8476	8100		
Jun. Social Sci.	16600	13100	13000	8600		
Junior Science	13000					
Junior Math	16593	8471	8100	7786		
Junior Phys. Ed.	11550	8600	8500			
Junior Home Ec.	8476					
Junior Indust. Arts	7786					
Junior Music	8600					
Guidance	11533					
Sen. Lang. Arts	12529					
Senior Social Sci.	13051					
Senior Science	13000	8471				
Senior Math	13100	12529	8100			
Senior Phys. Ed.	8478					
Senior Home Ec.	8477					
Senior Indust. Arts	7786					
Second Language	8600					
Business Education	13000	9570				
Fine Arts	13000					

the RRPM 1.6 in addition to salaries, were defined to correspond to the line-items used in the school accounts, i.e., supplies, school equipment, capital equipment, library and reference books, text- and work-books, and educational media. These expenditures were not listed by department or course level or student level, consequently a series of arbitrary decisions were necessary to apportion them in this way. The resulting calculated data were not representative of the pattern of expenditures in these categories but served to demonstrate that the RRPM 1.6 was able to represent data available from appropriate cost-accounting procedures.

Induced course load matrix (ICLM). The average credit hour load, generated by the students of each course level of every program, was calculated from the student data. While student data did not distinguish between matriculation and non-matriculation students at the senior high school level, the distinction was made in this application of the RRPM 1.6 to demonstrate the flexibility of the model in accommodating changes in administrative practice. An example of the data calculated for the ICLM is that, on the average, grade four students took 31.6 credits from the General Elementary Department, 2.00 credits from the Elementary Music Department, and 3.75

credits from the Elementary Physical Education Department (all credits being taken at course level-01).

Contact/credit hour ratio. The student credit hour is the unit for costing instruction by department. The relationship between a student credit hour and a student contact hour is a required input to the model. A credit hour was defined as forty minutes of instruction per week for the academic year, data applying to one semester only being apportioned over the two semesters making up the academic year. This was modified to accommodate a variation arising from the semestering of 3-credit courses, where three credits were given for the equivalent of one hundred minutes of instruction per week spread over two semesters. The general ratio used was 0.67, while for the special case of 3-credit courses offered over one semester the ratio used was 0.55. The use of the two ratios was intended to demonstrate that a student credit hour could be defined differently for different departments or course levels.

Proportions of different instruction types. The credit hour load calculated for each department at each course level is not differentiated by instruction type. Consequently the proportions of the instruction types offered by each department were calculated from raw data.

Class size. The class size data were obtained directly from the staff work load summaries. The average class size was calculated for each course level of every department.

Faculty work load and distribution. The policy of the school was that the staff work load should be 1400 minutes per week, except for the physical education teacher who received some reduction in lieu of time, outside school hours, given to coaching sporting teams. Staff work load summaries provided data for the calculation of the proportions of the various faculty ranks teaching each instruction type at all course levels in every department.

Costs of other than general academic instruction. The model has a facility which permits the allocation, to departments, of expenses which are not included in expenditures generated by general academic instruction. This facility was used to allocate expenditures, of special grants, by the Home Economics and Industrial Arts Departments.

Non-instructional expenses. Five non-instructional activities were defined, viz., Academic Support, General Administrative Services, Institutional Support,

Student Services, and Physical Plant Maintenance and Operation. Each of these were described by one or more estimating equations (Appendix 3). The expenditures were entered as constants since they could not be expressed as coefficients related to enrolment, number of teachers, number of credit hours produced, salaries, or the instructional budget.

The definition of non-instructional activities was loosely based on the NCHEMS Program Classification Structure (Gulko, 1970). The titles of the activities and equations are displayed in Appendix 3. Academic support was restricted to the library and only salary expenses were included. Expenditure for library stock was allocated to the instructional departments and thus not included as a non-instructional expense. Student services expenditure was restricted to that proportion of the salary of the counsellor which corresponded to the proportion of his time which was allocated to counselling and career guidance. Institutional support consisted of the executive management function of the principal, the identifiable expense being the appropriate proportion of the principal's salary. General administrative services were provided by two clerical assistants, one of whom provided support for the school administration while the other provided clerical assistance to the instructional

staff. Thus, expenses consisted of the salaries of the two clerical assistants. Physical plant maintenance and operation costs were made up of the salaries of the three caretakers, the cost of utilities, expenditure on the caretaker's supplies, and the costs of maintaining buildings and grounds.

Second Application of the RRPM 1.6

The second application of the RRPM 1.6 was derived from the first by providing a third instruction type and ranking salaries over the whole school rather than within each department. The third instruction type--Special Project--was defined for the purpose of accommodating supervised project work, for some senior high school students, to which no resources were formally allocated but for which credits were earned.

Six salary categories were selected by inspection of staff salaries--greater than \$16000, \$16000-13000, \$12999-11000, \$10999-9000, \$8999-8000, and less than \$8000--representing faculty ranks 1-6 respectively. In establishing the salary schedule for each department an average salary, weighted on the basis of the number of FTE, was calculated for each faculty rank (Table 5). The anticipated advantage of this modification was that data aggregated on the basis of faculty ranks would be

Table 5

Salaries Associated with the Faculty Ranks Defined
in the Second Application of the RRPM 1.6.

Department	Faculty Rank					
	1	2	3	4	5	6
	\$	\$	\$	\$	\$	\$
General Primary				9058		7750
Primary Music					8600	
General Elementary				9000		7755
Elementary Music					8600	
Elem. Phys. Ed.				9000	8518	7760
Jun. Lang. Arts			12531	9569	8288	
Jun. Social Sci.	16591	13051			8600	
Junior Science		13000				
Junior Math	16591				8286	7786
Junior Phys. Ed.			11550		8514	
Junior Home Ec.					8476	
Junior Indust. Arts						7786
Junior Music					8600	
Guidance			11533			
Sen. Lang. Arts			12529			
Senior Social Sci.		13051				
Senior Science		13000			8471	
Senior Math		13100	12529		8100	
Senior Phys. Ed.					8478	
Senior Home Ec.					8478	
Senior Indust. Arts						7786
Second Language					8600	
Business Education		13000		9570		
Fine Arts		13000				

meaningful.

Third Application of the RRPM 1.6

The third application of the RRPM 1.6 varied from the second in that programs and course levels were redefined, with a consequent redefinition of student levels. The redefinition of programs involved grouping the fifteen programs of the previous applications into five, on the basis of grade levels. Grade One, Grade Two, and Grade Three programs became student levels 1-3 of the Primary program; Grade Four , Grade Five , and Grade Six became student levels 4-6 of the Elementary program; Grade Seven, Grade Eight, and Grade Nine programs became student levels 1-3 of the Junior High program. Matriculation students in grades 10-12 were represented by student levels 4-6 of the Senior Matriculation program while the non-matriculation students in the same grades were represented by student levels 4-6 of the High School Diploma program. Recalculation of parameters was not necessitated by this modification although the induced course load matrix data were reorganized.

Course levels were redefined--as Primary, Elementary, Junior High, Grade Ten, Grade Eleven, and Grade Twelve--for the purpose of providing consistency among departments. An advantage of this consistency was

that data aggregated across departments were meaningful. A disadvantage of using six course levels was that cost per credit hour data were not available for individual grade levels, except in the senior high school.

Fourth Application of the RRPM 1.6

The only modification to the third application was to define a third level of organization. The twenty-four departments of the previous applications were termed "sub-departments" and grouped to form fourteen "departments." These departments were linked to form two "divisions"--Junior and Senior--on the basis of grades taught, i.e., grades 1-6 and 7-9 respectively (Table 6). The purpose of this modification was to test the facility of the RRPM 1.6 to simulate changes in organizational structure.

Final Application of the RRPM1.6

In consultation with the principal the third application of the RRPM 1.6 was selected as the most appropriate model of the school. The criteria used in selection were: that cost per student data should be available for all grade levels; and that data produced by aggregation of lower organizational levels should be meaningful. This latter criterion originated in the belief that, for time-series predictions, aggregated data

Table 6

Organizational Units Defined in the Fourth Application
of the RRPM 1.6: Titles and Relationships.

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JUNIOR DIVISION

Primary Department

General Primary Sub-Department

Primary Music Sub-Department

Elementary Department

General Elementary Sub-Department

Elementary Music Sub-Department

Elementary Physical Education Sub-Department

SENIOR DIVISION

Language Arts Department

Junior Language Arts Sub-Department

Senior Language Arts Sub-Department

Social Science Department

Junior Social Science Sub-Department

Senior Social Science Sub-Department

Science Department

Junior Science Sub-Department

Senior Science Sub-Department

Mathematics Department

Junior Mathematics Sub-Department

Senior Mathematics Sub-Department

Physical Education Department

Junior Physical Education Sub-Department

Senior Physical Education Sub-Department

Industrial Arts Department

Junior Industrial Arts Sub-Department

Senior Industrial Arts Sub-Department

Music Department

Junior Music Sub-Department

Guidance Department

Guidance Sub-Department

Business Education Department

Business Education Sub-Department

Fine Arts Department

Fine Arts Sub-Department

were more useful than data, on lower organizational levels, which could not be aggregated meaningfully.

Three modifications, to the third application of the RRPM 1.6, were suggested during the interview for use in developing the final application. These modifications were related to "other" instructional expenses, a third organizational level, and the naming of the student levels. The six student levels were named Grades 1 and 7, Grades 2 and 8, Grades 3 and 9, Grades 4 and 10, Grades 5 and 11, and Grades 6 and 12, respectively. This procedure did not require redefinition or the calculation of new parameters.

A third organizational level was defined by linking the Primary and Elementary divisions, to form the "Junior School," and the Junior and Senior High divisions, to form the "Senior School." No recalculation of parameters was required to effect this change since all that was added was a further stage of aggregation.

The principal was not satisfied with the representation of "other" instructional expenses due to the arbitrary nature of the proration decisions involved. Since an appropriate cost-accounting system was not in operation in the school the principal felt that the use of the county grant allocation formula would be a more realistic and useful approach. The variables calculated

by the RRPM 1.6 would then represent a budget based on the county's allocation formula, rather than the actual pattern of expenditure. The county grant allocation formula provided per-pupil grants in three categories, i.e., instructional materials, permanent equipment, and book repair. These grants were apportioned, to course levels in departments, on the basis of the credit hour load generated by the average student as represented by the induced course load matrix. A fourth category of "other" instructional expenditure--Grasslands--was defined to represent the costs of providing instruction, in industrial arts and home economics, to students from another school.

Output Data

The data calculated by the RRPM 1.6 are available in three report formats. An "Organizational Budget" is available for each organizational unit defined, a "Program Budget" is available for each program, and an "Institutional Summary" provides a summary of both the instructional and non-instructional expenditures of the organization. The data available in each type of report are considered in the remainder of this section along with the extent to which those data validly and accurately represent reality.

The organizational budget. The organizational budget report displays cost data for faculty, other expenses, and course levels. Faculty data include the weighted average salary and number of full-time equivalent (FTE), together with the total cost, for each faculty rank. The number of FTE of each faculty rank is also expressed as a percentage of the total number of FTE. The costs associated with each faculty rank are expressed as percentages of the total instructional expenditures of both the organizational unit and the whole institution. Total costs are reported, for each of the expense types defined, in addition to expenses of other than general academic instruction. These totals are also expressed as percentages of the organizational unit and institutional budgets. Data for each course level include: total cost, number of student credit hours produced, cost per credit hour, number of FTE faculty, and average number of credit hours produced per faculty member (productivity ratio). Total cost, credit hours produced, and number of FTE faculty are also reported as percentages of the organizational unit totals for each course level. In addition, the number of credit hours is expressed as a percentage of the total number of credit hours produced in the school. The provision of percentage figures facilitates comparison of the relative weights of the

various costs in determining total expenditure.

The definition of the variables for which data are reported was discussed in the preceding section--Input Data. In the opinion of the superintendent, all the organizational budget data were useful in decision-making at the county level. The principal considered unit cost data computed for course levels to be too gross for short term planning at the school level since details for individual courses were more relevant. However the principal conceded that in the long term, any data calculated for individual courses were too unstable to be useable and that less detailed data would be more appropriate.

The accuracy, with which the RRPM 1.6 simulated the school, was evaluated by comparing values estimated by the RRPM 1.6 with values calculated from raw data. Variables compared in this way were: number of FTE faculty, total cost of salaries associated directly with instruction, and the total of other expenditures on instruction. The difference between the actual and predicted number of FTE of each faculty rank does not exceed 0.10 for any one salary rank, 0.15 for any division total, and is 0.06 for the whole school (Table 7). The total expenditures on salaries directly associated with instruction were \$151,447 and \$151,050--based on raw data

Table 7

Comparison of Estimates of FTE Faculty
with Actual Numbers

Organizational Unit	Faculty Rank	Number of FTE		
		Actual (1)	RRPM (2)	Difference (1) - (2)
Primary Division	4	2.06	2.09	-0.03
	5	.18	.17	0.01
	6	1.00	.90	0.10
		3.24	3.16	0.08
Elementary Division	4	.90	.86	0.04
	5	.36	.34	0.02
	6	1.89	1.98	-0.09
		3.15	3.18	-0.03
Junior High Division	1	.17	.18	-0.01
	2	1.38	1.42	-0.04
	3	.44	.47	-0.03
	4	.29	.29	0.00
	5	1.58	1.65	-0.07
	6	.63	.63	0.00
		4.49	4.64	-0.15
Senior High Division	2	1.55	1.56	-0.01
	3	.71	.72	-0.01
	4	.37	.37	0.00
	5	1.63	1.63	0.00
	6	.29	.29	0.00
		4.55	4.57	-0.02
All Organizational Levels	1	.17	.18	-0.01
	2	3.00	2.98	0.02
	3	1.16	1.19	-0.03
	4	3.66	3.61	0.05
	5	3.71	3.79	-0.08
	6	3.91	3.86	0.05
		15.61	15.55	0.06

and calculated by the RRPM 1.6 respectively--the difference being 0.3% of the actual value. The maximum difference between actual and predicted instructional expenditures, other than salaries, does not exceed 2.0%, of the actual amount, for any category (Table 8).

Table 8

Comparison of Predicted and Actual Instructional
Expenditures Other Than Salaries

Expenditure Category	Actual \$	Predicted \$	Differences ¹	
			\$	%
Instructional Materials	9254	9241	13	0.14
Permanent Equipment	1292	1318	26	2.01
Book Repair	161	160	1	0.62
Other Instruction	1627	1639	12	0.74
Total	12334	12358	24	0.19

¹Percentage differences are expressed in relation to the actual value.

The program budget. For each student level of every program, the program budget (Appendix 2) reports the cost per student and number of students, together with weighted averages or totals. The number of students is also expressed as a percentage of both the number in the program and the total number in the school. The total cost of each student level and of the program are listed

as both dollar values and percentages of both the program and total instructional budgets.

A summary for the institution as a whole contains the same information as is reported for each program. The definition of a student level to represent two grade levels, as described when considering the final application of the model earlier in this chapter, renders this summary largely meaningless.

Both the principal and superintendent agreed that cost per student data were an important input to administrative decision-making although more so at the county level than in the school. The accuracy of per pupil estimates could not be verified against actual data since no alternative source was available.

The institutional summary. The institutional summary (Appendix 3) reports summary costs for both the instructional and non-instructional activities of the school. The data for the instructional program are calculated from the input data described earlier. Each of the other activities was described by a series of user supplied estimating equations. The cost calculated by each equation is shown together with the way in which that cost was related to the various organizational parameters. In this study the actual expenditures were entered as

constant amounts, thus describing the expenditures of non-instructional activities with a high degree of accuracy, i.e., 0.0% error. However the facility is available for a more sophisticated approach to predicting non-instructional expenditures, i.e., by relating these expenditures to the institutional parameters available in the model.

CAN THE RRPM 1.6 BE USED TO SIMULATE A SCHOOL?

The model can accept changes in the form of new parameters calculated by the user. Since any of the parameters used in modelling the school may be changed, the model was able to accommodate any changes which could be described in terms of the concepts used in applying the RRPM 1.6 initially. Alternatively the implicit mathematical relationships between parameters and variables may be used.

The extent to which any simulation is accurate depends on the degree to which the implicit relationships represent those in the school. The facility to make blanket parameter changes is provided for student enrolment, faculty salaries, credit to contact hour ratio, class size, and faculty work load. These changes must be entered as positive or negative percentages for the appropriate organizational units and levels.

The use of the model to predict future resource requirements assumes a degree of stability in the organization. The question arises as to which level of aggregation is sufficiently stable to provide an appropriate base for prediction yet supply information which will be useful in decision-making. Although data on each course are required, the RRPM 1.6 reports data by course level only. The implicit assumption is that the relationships between parameters and variables is more likely to be stable over time at the higher level of aggregation. Questions of stability can only be answered after the event whether historical data are used, or predictions are verified as time progresses. Even the use of these approaches does not guarantee that predictions will not be rendered inaccurate by unpredictable changes in the organization or its environment. Thus evaluation of the accuracy with which the RRPM 1.6 can be used to simulate the school must focus on the extent to which the model represents the parameters and relationships involved in the changes.

Major concepts and associated parameters assumed to be stable over time are: the induced course load matrix; the distribution of the instructional load, at each course level, over faculty ranks and instruction types; the definitions of organizational units; and the

estimating equations for both instructional and non-instructional expenses. While the possibility exists of altering these concepts to reflect basic changes in the organization, the model is most useful where they are stable. Information can then be readily obtained for parameters which commonly vary over time, e.g., enrolment, salaries, and class size.

Using the 1972/73 data as a base, annual expenditures were predicted to 1980/81 inclusive. Initially these predictions were based on the following changes: a salary increase of 7% per annum; and non-instructional expenditure increase of 5% per annum to allow for rising prices. Enrolments were projected on the basis of a zero attrition rate, an enrolment of 20 grade one students in 1973/74, and subsequent grade one enrolments arbitrarily set at 15 or 20 alternately. The initial report for 1972/73 predicted the need for 14.79 FTE faculty, a decrease of 0.76, for a reduction in enrolment of 11. Such a small change in enrolment is in reality unlikely to affect the number of FTE required. Thus a second prediction was made using the same assumptions as the first together with an adjustment in the average class size at each course level, by a percentage corresponding to the percentage change in enrolments, in the program generating most of the load on

that course level. On this basis 15.22 FTE faculty were predicted, a decrease of 0.33, which was closer to the 1972/73 prediction and the number anticipated by the principal.

The relationship between enrolments and the number of FTE faculty, was not represented accurately by the RRPM 1.6. The model calculates the number of FTE faculty by using the number of credit hours which must be produced to meet student demands, as calculated on the basis of the induced course load matrix. Thus the changes in the number of credit hours demanded, result in a corresponding change in the number of FTE faculty to meet that demand. In reality, the number of FTE faculty will only change where there is a change in the number of classes, rather than in the number of students. The effects of this unrealistic representation can be reduced, to a limited extent, by changing the class sizes to reflect the effects of enrolment changes.

A number of changes were simulated to demonstrate the capabilities of the RRPM 1.6. The accuracy of these simulations could not be checked against actual data since no alternative sources existed. However in each case the predicted changes in variables were justifiable as logical consequences of the parameter changes. In addition, the magnitude of each change was subjectively assessed, in

consultation with the principal, to determine the extent to which it was intuitively reasonable.

In the first case salaries were increased by 10% and non-instructional expenses by 6% to provide a comparison with the prediction for 1973/74--changes of 7% and 5% respectively. Faculty work load was increased and decreased by forty minutes per day in the next two cases based on 1972/73 data. Five cases were then set up to predict the effects of a general increase in enrolments of 10%, 20%, 30%, 40%, and 50%. In an attempt to represent these changes more realistically class sizes were increased by the same percentage as enrolments to a maximum of 20%. The situation in which all students in a program might be required to take certain core courses was simulated by changing the induced course load matrix (ICLM) so that all matriculation students took five credits of instruction in the French language, at an appropriate level. A final example of the use of the RRPM 1.6 was in the addition of a new program. A new program--Technical Diploma--was postulated at the senior high school level with an hypothetical enrolment and ICLM. These cases were considered by the principal to be a representative sample of the types of alternatives which are assessed in the planning process.

IS THE RRPM 1.6 USEFUL?

The forty-five minute discussion with the superintendent was not long enough for him to gain any real understanding of the RRPM 1.6. However focussing discussion on the nature of the output data enabled the superintendent to comment on the relevance of these data to planning at the county level. In his opinion the types of data reported by the RRPM 1.6 were highly relevant to planning at the county level provided that comparative data were available from other jurisdictions. This proviso was based on his belief that school district budgets were evaluated, by provincial authorities, on the basis of interdistrict comparisons.

In the opinion of the school principal the RRPM 1.6 would be more useful in planning at the school level if it provided information on individual courses. In addition he believed that the data available from the RRPM 1.6 could have been obtained directly from raw data with not much more effort than was required to derive the parameters required by the model. He was, however, prepared to concede that this was a property of the small size of his school and that in larger schools the RRPM 1.6 would be of value. The principal also expressed the opinion that the use of the RRPM 1.6 to predict future

expenditures was appropriate even to small schools.

SUMMARY

The selection of the school to be used in this study was based on four criteria related to school size, range of grade levels, diversity in senior high school programs, and school administration cognizance of management techniques.

Two approaches were used in the analysis of data for each of the three research questions: the extent to which the concepts used in the RRPM 1.6 could be used to represent the school, i.e., the validity of the model; and the accuracy of predictions in comparison with actual values of variables. In considering the extent to which the RRPM 1.6 could be used to model the school the various applications of the concepts used in the model were discussed then evaluated. The variates calculated by the model were compared with the actual values, calculated by hand from raw data, for the purpose of evaluating the accuracy with which the model simulated the school.

The ability of the model to simulate changes in the school depended partly on the answer to the first research question but was also heavily dependent on the stability of the organizational structure. Two types of simulation were studied: the prediction of expenditures

over time; and the prediction of expenditures for given changes in parameters.

Data related to the question of the usefulness of the RRPM 1.6 consisted of the opinions of the principal and superintendent as expressed in interviews.

Chapter 5

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

This concluding chapter provides a brief summary of the preceding chapters together with a statement of the conclusions drawn in relation to the three research questions. Following this is a statement of the implications of these conclusions, for use of the RRPM 1.6 in schools, then some suggestions for further research into the use of the RRPM 1.6 in modelling and simulating cost/resource allocation in schools.

SUMMARY

This investigation originated in the belief that the RRPM 1.6 was sufficiently flexible to model and simulate a school. This belief was based on experiences gained in applying the RRPM 1.3 to a community college. An additional factor was the need for a cost/resource model to overcome the problems of resource allocation in schools.

The school used in the investigation, met the selection criteria in that enrolments were small, there was a range of grades, senior high school programs were diverse, and the school administration was cognizant of

management techniques.

Data were collected by interview with the principal and from both county and school records. The raw data were used to determine whether the RRPM 1.6 could be used to model the school, and as a base for the calculation of parameters used in simulation of the school for the purpose of assessing the validity of the model.

Evaluation of the RRPM 1.6 centred around the three research questions. The validity, with which the RRPM 1.6 modelled the school, was analysed by applying the model in five different ways, using data from the current operating budget as a base for the derivation of the relationships supplied to the RRPM 1.6. The validity of the model was assessed by simulating the current operating year, 1972-73, then comparing variates calculated by the RRPM 1.6 with those derived from raw data. The accuracy of a number of other simulations was inferred from their intuitive reasonableness, since alternate sources of the same data were not available.

CONCLUSIONS

The concepts used in the RRPM 1.6 were able to model the school, e.g., credit hour, induced course load matrix, instruction types, faculty ranks, and instructional and non-instructional expense estimating

equations. Some concepts, such as course level and student level, could not be modelled exactly, since some grouping was necessary to fit the twelve grade levels to the seven levels provided by the model. Many of these concepts were used in part only, due either to current administrative practice or lack of suitable data sources. The mathematical relationships within the school could be modelled, with the exception of that between enrolments and FTE faculty.

No alternative sources were available to permit objective comparisons between predicted and actual data. Thus accuracy of simulation was estimated by the closeness of fit of the model, i.e., simulations of changes were only as accurate as the model was valid. Consequently, simulations were inaccurate due to poor representation of the relationship between enrolments and FTE faculty, even though some compensation was possible by adjusting class sizes.

Other weaknesses of the RRPM 1.6 were due to limitations imposed by the designing of the model for post-secondary institutions. The limitation of both student and course levels, to a maximum of seven, reduced the detail in which the school was be represented by the RRPM 1.6. This same limitation rendered meaningless, some of the aggregated data.

The data, reported by the RRPM 1.6, were of limited use at the school level, i.e., heuristic applications and long term predictions for higher organizational levels. The value of both these applications was influenced by the modelling defects discussed in the preceding paragraphs. The RRPM 1.6 was potentially more useful at the county level due to the greater accuracy of simulation which was achieved when data were reported for the school as a whole. This was reinforced by the greater usefulness, at the county level, of both the type of data provided and the level of aggregation. Yet another factor supporting the value of the RRPM 1.6 at the county level, was that the major resource allocation decisions were made at that level. The inference of the above discussion is that the RRPM 1.6, as an administrative tool, is more likely to be useful at the county level rather than in the school. This usefulness was reduced by the uncertainty of prediction resulting from the poor representation of the relationship between enrolments and FTE faculty.

IMPLICATIONS

One implication of the above conclusion, is that the RRPM 1.6 should only be considered, for application to a school, where aggregated data are required for planning

decisions at the county level. Such considerations should include an evaluation of the extent to which the divergence, between predicted and actual values of expenditures and planning parameters, is acceptable. Additional account should be taken of the potential for error in the poor representation of the relationships between some variables.

Another implication, arising from this investigation, is that the types of information reported by the RRPM 1.6 are of value in planning decisions at both the school and school district levels. This, together with the acknowledged usefulness of simulations of the school, strongly supports the value of a cost/resource allocation model at both levels. Such a model needs to be more representative of the mathematical relationships, and to facilitate more accurate representation of the organizational structure of the school by having fewer restrictions than the RRPM 1.6.

SUGGESTIONS FOR FURTHER RESEARCH

The value of the types of data reported by the RRPM 1.6, at both school and county level suggested that research, designed to overcome the weaknesses of the model, is worthwhile. Desirable modifications are:

1. an increase in the maximum number of student and

course levels to at least twelve;

2. the relating of changes in FTE faculty to changes in the number of classes, rather than changes in enrolments; and

3. the provision of unit cost data and planning parameters for individual courses, rather than for course levels.

Two capabilities of the model were not used in this investigation, i.e., the facility to allocate expenditure associated with a department head who carries out both teaching and administrative duties; and the ability to prorate expenses generated by non-teaching support staff who are assigned to instructional departments. Both these capabilities could be studied by applying the RRPM 1.6 to a larger school which has these types of personnel.

Conclusions on the appropriateness of the RRPM 1.6, at the system level, were based on the advantage of comparable information being available were the RRPM 1.6 to be applied to all schools in the jurisdiction. Research into the applicability of the model to the system, as an organizational unit, would be worthwhile.

BIBLIOGRAPHY

Chestnut, Harold

- 1965 Systems Engineering Tools, New York: John Wiley and Sons Inc.

Clark, D.G.

- 1972 Introduction to the Resource Requirements Prediction Model 1.6: Technical Report No. 34A, National Center for Higher Education Management Systems, at Western Interstate Commission for Higher Education, Boulder, Colorado.

Fennel, B.H.

- 1972 An Analysis of the Variations Among Unit Costs of the Cost Analysis Research Project, The University of Alberta: Unpublished Master's Thesis.

Gulko, W.W.

- 1970 Program Classification Structure, Planning and Management Systems Division, Western Interstate Commission for Higher Education, Boulder, Colorado.

Hull, L.E.

- 1961 "Pitfalls in the Use of Unit-Cost Studies," Journal of Higher Education, 24.

Meek, J.C.

- 1972 Unit Cost Analysis of the Implementary Expenditures in an Urban School System, The University of Alberta: Unpublished Master's Thesis.

Purkess, G.A.W.

- 1971 Unit Cost Analysis of Educational Expenditures of the Lac La Biche School Division No. 51: 1969-1970, The University of Alberta: Unpublished Master's Thesis.

Stallard, Troy F.

- 1970 "A Computerized Systems Model of a Public School System: Center Technical Paper No. 7," Center for Occupational Education, North Carolina State University, Educational Resources Information Center, ED 057 555.

Witner, D.

1967 "Unit Cost Studies," Wisconsin Board of Regents of
State Universities, Educational Resources Inform-
ation Center, ED 013 492.

APPENDIX 1
SAMPLE ORGANIZATIONAL BUDGET REPORT

APPENDIX 2
SAMPLE PROGRAM BUDGET REPORT

APPENDIX 3

SAMPLE INSTITUTIONAL SUMMARY REPORT

A S M A L L A L B E R T A S C H O O L
RESOURCE REQUIREMENTS PREDICTION MODEL

ITER = (01) BASE 1972/73
BASE = (**)

* I N S T I T U T I O N A L S U M M A R Y *

* A C T I V I T Y C O S T S *

* ESTIMATING EQUATION COEFFICIENTS *

* FAC-\$ STAFF-\$ BUDGET *

ACTIVITY NAME	ACTIVITY COST	CONSTANT	ENROLL.	FACULTY	STAFF	HOURS	FAC-\$	STAFF-\$	BUDGET
1.00 INSTRUCTION PGM									
1.10 GENERAL ACADEMIC	164,398	164,398							
SUB-TOTAL	164,398								
40.00 ACADEMIC SUPPORT									
40.10 LIBRARY SALARIES	5,314	5,314							
SUB-TOTAL	5,314								
50.00 STUDENT SERVICES									
50.30 COUNSEL. + GUID.	5,304	5,304							
SUB-TOTAL	5,304								
60.00 INSTIT. SUPPORT									
60.10 EXEC. MANAGEMENT	14,102	14,102							
SUB-TOTAL	14,102								
63.00 GEN ADMIN SERV									
63.10 ADMIN CLER ASSIS	3,334	3,334							
63.20 INSTR CLER ASSIS	2,552	2,552							
SUB-TOTAL	5,886								
65.00 PHYS PLANT +OPER									
65.10 SALARIES	15,785	15,785							
65.20 UTILITIES	10,349	10,349							
65.30 CARETAKER SUPPLY	1,500	1,500							
65.40 MAINTENANCE	2,358	2,358							
SUB-TOTAL	29,996								
*** TOTAL ***	224,996								

APPENDIX 4

COMPLETE SET OF REPORTS FOR THE
THE BASE YEAR: 1972/73

 * (0001) GENERAL PRIMARY DEPARTMENT DIVISION SCHOOL
 * * (0001) JUNIOR
 * * (0001)

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET	PERCENT OF PRODUCT. RATIO
CHAIRMAN							
FACULTY (BY RANK)							
(04) FACULTY RANK--04	9,085	2.09	69.90	18,988	68.06	11.5500	
(06) FACULTY RANK--06	7,750	.90	30.10	6,975	25.00	4.2428	
(**) FACULTY TOTALS	8,683	2.99	100.00	25,963	93.07	15.7929	
STAFF (BY CATEGORY)							
EXPENSES (BY TYPE)							
(IM) INST. MATERIALS				1,650	5.91	1.0037	
(PE) PERMANENT EQUIPT				253	.91	.1539	
(BR) BOOK REPAIR				31	.11	.0189	
(**) EXPENSE TOTALS				1,934	6.93	1.1764	
ADDITIONAL EXPENSES							
*** TOTALS ***		2.99		27,897	100.00	16.9692	
COSTS BY COURSE LEVEL							
(PR) PRIMARY	27,897	100.00	100.00	11.68	2.99	100.00	798.66
(**) CRSE LVL TOTALS	27,897	100.00	100.00	11.68	2.99	100.00	798.66

 * ORGANIZATIONAL BUDGET *
 * (0002) PRIMARY MUSIC DEPARTMENT *
 * (0001) JUNIOR DIVISION SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET	PER- CENT PRODUCT. RATIO
CHAIRMAN							
FACULTY (BY RANK)							
(05) FACULTY RANK--05	8,600	.17	100.00	1,462	93.06	.8893	
(**) FACULTY TOTALS	8,600	.17	100.00	1,462	93.06	.8893	
STAFF (BY CATEGORY)							
EXPENSES (BY TYPE)							
(IM) INST. MATERIALS					5.92	.0566	
(PE) PERMANENT EQUIPT					.89	.0085	
(BR) BOOK REPAIR					.13	.0012	
(**) EXPENSE TOTALS				109	6.94	.0663	
ADDITIONAL EXPENSES							
*** TOTALS ***				1,571	100.00	.9556	
COSTS BY COURSE LEVEL							
(PR) PRIMARY	1,571	100.00	100.00	11.72	.17	100.00	788.24
(**) CASE LVL TOTALS	1,571	100.00	100.00	11.72	.17	100.00	788.24

 * ORGANIZATIONAL BUDGET *
 * (0001) PRIMARY JUNIOR DIVISION SCHOOL *

SALARY RATE FULL TIME EQUIVALENT PERCENT COSTS PERCENT OF ORGANIZATIONAL BUDGET PERCENT OF INSTRUCTIONAL BUDGET

CHAIRMAN

FACULTY (BY RANK)
 (04) FACULTY RANK--04
 (05) FACULTY RANK--05
 (06) FACULTY RANK--06
 (**) FACULTY TOTALS

9.085 2.09 66.14 18.988 64.44 11.5500
 8.600 .17 5.38 1.462 4.96 .8893
 7.750 .90 28.48 6.975 23.67 4.2428

 8.679 3.16 100.00 27.425 93.07 16.6821
 =====

STAFF (BY CATEGORY)

EXPENSES (BY TYPE)
 (IM) INST. MATERIALS
 (PE) PERMANENT EQUIPT
 (BR) BOOK REPAIR
 (**) EXPENSE TOTALS

 1.743 5.91 1.0602
 267 .91 .1624
 33 .11 .0201

 2.043 6.93 1.2427

ADDITIONAL EXPENSES

*** TOTALS ***

 3.16 100.00 17.9248
 =====

COSTS BY COURSE LEVEL

(PR) PRIMARY

29.468 100.00 2.522 18.94 3.16 100.00 798.10

(**) CRSE LVL TOTALS

29.468 100.00 2.522 18.94 3.16 100.00 798.10

 * ORGANIZATIONAL BUDGET *
 * (0003) GEN. ELEMENTARY DEPARTMENT *
 * (0002) JUNIOR ELEMENTARY DIVISION *
 * (001) SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(04) FACULTY RANK--04	9,000	.81	30.00	7,290	30.26	4.4344
(06) FACULTY RANK--06	7,755	1.89	70.00	14,657	60.83	8.9156
(**) FACULTY TOTALS	8,129	2.70	100.00	21,947	91.09	13.3499
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				1,832	7.60	1.1144
(PE) PERMANENT EQUIPT				281	1.17	.1709
(BR) BOOK REPAIR				34	.14	.0207
(**) EXPENSE TOTALS				2,147	8.91	1.3060
ADDITIONAL EXPENSES						
*** TOTALS ***		2.70		24,094	100.00	14.6559
COSTS BY COURSE LEVEL						
(EL) ELEMENTARY	24,094	100.00	100.00	9.17	2.70	100.00
(**) CRSE LVL TOTALS	24,094	100.00	100.00	9.17	2.70	100.00
						973.33
						973.33

 * (0004) ELEMENTARY MUSIC DEPARTMENT
 * (0002) ELEMENTARY JUNIOR SCHOOL
 * (0001) *****

 * ORGANIZATIONAL BUDGET *

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 * ORGANIZATIONAL BUDGET *

A S M A L L A L B E R T A S C H O O L
 RESOURCE REQUIREMENTS PREDICTION MODEL

 * (0005) ELEM. PHYS. ED. DEPARTMENT
 * (0002) ELEM. ELEMENTARY JUNIOR SCHOOL
 * (0001) (0001)

PERCENT OF PERCENT OF
 ORGANIZATIONAL INSTRUCTIONAL
 BUDGET BUDGET

CHAIRMAN

FACULTY (BY RANK)
 (04) FACULTY RANK--04
 (05) FACULTY RANK--05
 (06) FACULTY RANK--06
 (**) FACULTY TOTALS

STAFF (BY CATEGORY)

EXPENSES (BY TYPE)
 (IM) INST. MATERIALS
 (PE) PERMANENT EQUIPT
 (BR) BOOK REPAIR
 (**) EXPENSE TOTALS

ADDITIONAL EXPENSES

*** TOTALS ***

COSTS BY COURSE LEVEL
 (EL) ELEMENTARY
 (**) CRSE LVL TOTALS

FTE FACULTY
 PERCENT
 PRODUCT RATIO

PERCENT OF
 ORGANIZATIONAL INSTRUCTIONAL
 BUDGET BUDGET

PERCENT OF
 ORGANIZATIONAL INSTRUCTIONAL
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 ORGANIZATIONAL INSTRUCTIONAL
 BUDGET BUDGET

 * ORGANIZATIONAL BUDGET *
 * (0006) JUN. LANG. ARTS DEPARTMENT *
 * (0003) JUNIOR HIGH DIVISION *
 * (0002) SENIOR SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(03) FACULTY RANK--03	12,531	.29	24.79	3,634	29.72	2,2105
(04) FACULTY RANK--04	9,569	.29	24.79	2,775	22.70	1,6880
(05) FACULTY RANK--05	8,288	.59	50.43	4,890	39.99	2,9745
(**) FACULTY TOTALS	9,657	1.17	100.00	11,299	92.41	6.8730
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				768	6.28	.4672
(PE) PERMANENT EQUIPT				143	1.17	.0870
(BR) BOOK REPAIR				17	.14	.0103
(**) EXPENSE TOTALS				928	7.59	.5645
ADDITIONAL EXPENSES						
*** TOTALS ***				12,227	100.00	7.4374
COSTS BY COURSE LEVEL						
(JH) JUNIOR HIGH	12,227	100.00	100.00	9.12	1.17	100.00
(**) CRSE LVL TOTALS	12,227	100.00	100.00	9.12	1.17	100.00
						1,145.30
						1,145.30

 * ORGANIZATIONAL BUDGET *
 * (0007) JUN. SOCIAL SCI. DEPARTMENT *
 * (0003) JUNIOR HIGH *
 * (0002) SENIOR SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(01) FACULTY RANK--01	16,600	.03	3.75	498	4.55	.3029
(02) FACULTY RANK--02	13,050	.74	92.50	9,657	88.28	5.8742
(05) FACULTY RANK--05	8,600	.03	3.75	258	2.36	.1569
(**) FACULTY TOTALS	13,016	.80	100.00	10,413	95.19	6.3340
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS						
(PE) PERMANENT EQUIPT						
(BR) BOOK REPAIR						
(**) EXPENSE TOTALS						
ADDITIONAL EXPENSES						
*** TOTALS ***						
COSTS BY COURSE LEVEL						
(JH) JUNIOR HIGH	10,939	100.00	PER- CENT	PERCENT TOT HRS	FTE FACULTY	PER- CENT PRODUCT. RATIO
(**) CRSE LVL TOTALS	10,939	100.00	797	5.99	.80	100.00 996.25
			797	5.99	.80	100.00 996.25

 * (0008) JUNIOR SCIENCE DEPARTMENT
 * (0003) JUNIOR HIGH DIVISION
 * (0002) JUNIOR SENIOR SCHOOL

 * ORGANIZATIONAL BUDGET

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(02) FACULTY RANK--02	13.000	.68	100.00	8.840	94.81	5.3772
(**) FACULTY TOTALS	13.000	.68	100.00	8.840	94.81	5.3772
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				421	4.52	.2561
(PE) PERMANENT EQUIPT				56	.60	.0341
(BR) BOOK REPAIR				7	.08	.0043
(**) EXPENSE TOTALS				484	5.19	.2944

ADDITIONAL EXPENSES						
*** TOTALS ***				9.324	100.00	5.6716

	COST	PER- CENT	HOURS PRODUCED	PER- CENT TOT HRS	UNIT COST	FTE FACULTY	PER- CENT	PRODUCT RATIO
COSTS BY COURSE LEVEL								
(JH) JUNIOR HIGH	9.324	100.00	735	5.52	12.69	.68	100.00	1.080.88
(**) CRSE LVL TOTALS	9.324	100.00	735	5.52	12.69	.68	100.00	1.080.88

 * ORGANIZATIONAL BUDGET *
 * (0009) JUNIOR MATH *
 * (0003) JUNIOR HIGH *
 * (0002) SENIOR *
 * (0001) DEPARTMENT *
 * (0000) DIVISION *
 * (0000) SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(01) FACULTY RANK--01	16,593	.15	25.42	2,489	38.70	1,5140
(05) FACULTY RANK--05	8,287	.15	25.42	1,243	19.33	.7561
(06) FACULTY RANK--06	7,786	.29	49.15	2,258	35.11	1,3735
(**) FACULTY TOTALS	10,153	.59	100.00	5,990	93.13	3,6436
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				384	5.97	.2336
(PE) PERMANENT EQUIPT				51	.79	.0310
(BR) BOOK REPAIR				7	.11	.0043
(**) EXPENSE TOTALS				442	6.87	.2689
ADDITIONAL EXPENSES						
*** TOTALS ***				6,432	100.00	3,9125
COSTS BY COURSE LEVEL						
(JH) JUNIOR HIGH	6,432	100.00	100.00	5.03	.59	1,135.59
(**) CRSE LVL TOTALS	6,432	100.00	100.00	5.03	.59	1,135.59

 * ORGANIZATIONAL BUDGET *

 * (0011) JUNIOR HOME EC. *
 * (0003) JUNIOR HIGH *
 * (0002) SENIOR SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	HOURS PRODUCED	PER- CENT	PERCENT TOT HRS	UNIT COST	FTE FACULTY	PER- CENT	PRODUCT. RATIO
CHAIRMAN									
FACULTY (BY RANK)									
(05) FACULTY RANK--05	8,474	.35		100.00		2,966	71.96	1.8042	
(**) FACULTY TOTALS	8,474	.35		100.00		2,966	71.96	1.8042	
STAFF (BY CATEGORY)									
EXPENSES (BY TYPE)									
(1M) INST. MATERIALS						165	4.00	.1004	
(PE) PERMANENT EQUIPT						22	.53	.0174	
(BR) BOOK REPAIR						3	.07	.0018	
(GL) GRASSLANDS						866	21.01	.5268	
(**) EXPENSE TOTALS						1,056	25.62	.6423	
ADDITIONAL EXPENSES						100	2.43	.0608	
*** TOTALS ***						4,122	100.00	2.5073	
COSTS BY COURSE LEVEL									
(JH) JUNIOR HIGH	4,122	100.00	288	100.00	2.16	14.31	.35	100.00	822.86
(**) CRSE LVL TOTALS	4,122	100.00	288	100.00	2.16	14.31	.35	100.00	822.86

A S M A L L A L B E R T A S C H O O L
RESOURCE REQUIREMENTS PREDICTION MODEL

ITER = (01) BASE 1972/73
BASE = (**)

* (0012) JUNIOR IND. ARTS DEPARTMENT
* (0003) JUNIOR DIVISION
* (0002) SENIOR SCHOOL

* O R G A N I Z A T I O N A L B U D G E T

	SALARY RATE	FULL TIME EQUIVALENT	HOURS PRODUCED	PER- CENT	PERCENT TOT HRS	UNIT COST	FTE FACULTY	PER- CENT	PRODUCT RATIO
CHAIRMAN									
FACULTY (BY RANK)									
(06) FACULTY RANK--06	7,785	.34		100.00		2,647	68.88		1.6101
(**) FACULTY TOTALS	7,785	.34		100.00		2,647	68.88		1.6101
STAFF (BY CATEGORY)									
EXPENSES (BY TYPE)									
(IM) INST. MATERIALS						150	3.90		.0912
(PE) PERMANENT EQUIPT						20	.52		.0122
(BR) BOOK REPAIR						3	.08		.0018
(GL) GRASSLANDS						773	20.11		.4702
(**) EXPENSE TOTALS						946	24.62		.5754
ADDITIONAL EXPENSES									
*** TOTALS ***						250	6.51		.1521
						3,843	100.00		2.3376
COSTS BY COURSE LEVEL									
(JH) JUNIOR HIGH	3,843	100.00	261	100.00	1.96	14.72	.34	100.00	767.65
(**) CRSE LVL TOTALS	3,843	100.00	261	100.00	1.96	14.72	.34	100.00	767.65

RESOURCE REQUIREMENTS PREDICTION MODEL

 * (0013) JUNIOR MUSIC DEPARTMENT *****
 * (0003) JUNIOR HIGH DIVISION *****
 * (0002) SENIOR SCHOOL *****

 * ORGANIZATIONAL BUDGET *****

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(05)	8,600	.16	100.00	1,376	94.05	.8370
(**) FACULTY TOTALS	8,600	.16	100.00	1,376	94.05	.8370
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				76	5.19	.0462
(PE) PERMANENT EQUIPT				10	.68	.0061
(BR) BOOK REPAIR				1	.07	.0006
(**) EXPENSE TOTALS				87	5.95	.0529
ADDITIONAL EXPENSES						
*** TOTALS ***		.16		1,463	100.00	.8899
COSTS BY COURSE LEVEL						
(JH) JUNIOR HIGH	1,463	100.00	132	11.08	.16	100.00
(**) CRSE LVL TOTALS	1,463	100.00	132	11.08	.16	100.00
						825.00
						825.00

 * (0014) GUIDANCE DEPARTMENT
 * (0003) JUNIOR HIGH DIVISION
 * (0002) SENIOR SCHOOL

 * ORGANIZATIONAL BUDGET

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(03) FACULTY RANK--03	11,531	.16	100.00	1,845	96.14	1.1223
(**) FACULTY TOTALS	11,531	.16	100.00	1,845	96.14	1.1223
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				64	3.34	.0399
(PE) PERMANENT EQUIPT				9	.47	.0055
(BR) BOOK REPAIR				1	.05	.0006
(**) EXPENSE TOTALS				74	3.86	.0450
ADDITIONAL EXPENSES						
*** TOTALS ***				1,919	100.00	1.1673
COSTS BY COURSE LEVEL						
{JH} JUNIOR HIGH	1,919	100.00	100.00	.84	.16	100.00
{**} CRSE LVL TOTALS	1,919	100.00	100.00	.84	.16	100.00
						700.00
						700.00


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ITER = (01) BASE 1972/73
BASE = (**)
A S M A L L A L B E R T A S C H O O L
RESOURCE REQUIREMENTS PREDICTION MODEL
1.6-(06) PAGE 19
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* ORGANIZATIONAL BUDGET *

* (0003) JUNIOR HIGH *
* (0002) SENIOR *
* DIVISION *
* SCHOOL *

CHAIRMAN	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	ORGANIZATIONAL BUDGET	INSTRUCTIONAL BUDGET
FACULTY (BY RANK)						
(01) FACULTY RANK--01	16,594	.18	3.88	2,987	5.54	1,8169
(02) FACULTY RANK--02	12,026	1.42	30.60	18,497	34.30	11,2514
(03) FACULTY RANK--03	12,149	.47	10.13	5,710	10.59	3,4733
(04) FACULTY RANK--04	9,569	.29	6.25	2,775	5.15	1,6880
(05) FACULTY RANK--05	8,415	1.65	35.56	13,884	25.74	8,4454
(06) FACULTY RANK--06	7,786	.63	13.58	4,905	9.09	2,9836
(**) FACULTY TOTALS	10,508	4.64	100.00	48,758	90.40	29,6585
STAFF (BY CATEGORY)						

[illegible]

 * (0016) SEN. SOCIAL SCI. DEPARTMENT
 * (0004) SENIOR HIGH SCHOOL
 * (0002) SENIOR SCHOOL

PERCENT OF ORGANIZATIONAL BUDGET PERCENT OF ORGANIZATIONAL BUDGET PERCENT OF INSTRUCTIONAL BUDGET

SALARY RATE FULL-TIME EQUIVALENT PERCENT COSTS

CHAIRMAN FACULTY (BY RANK) (02) FACULTY RANK--02

(**) FACULTY TOTALS

STAFF (BY CATEGORY)

EXPENSES (BY TYPE) (IM) INST. MATERIALS (PE) PERMANENT EQUIPT (BR) BOOK REPAIR

(**) EXPENSE TOTALS

ADDITIONAL EXPENSES *** TOTALS ***

COSTS BY COURSE LEVEL

(TN) GRADE TEN (EV) GRADE ELEVEN (TW) GRADE TWELVE

(**) CRSE LVL TOTALS

PER- CENT HOURS PRODUCED PER- CENT PERCENT TOT HRS UNIT COST FTE FACULTY PER- CENT PRODUCT. RATIO

13.051 13.051 100.00 100.00 9.266 9.266 95.40 95.40 5.6363 5.6363

13.051 13.051 100.00 100.00 9.266 9.266 95.40 95.40 5.6363 5.6363

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13.051 13.051 100.00 100.00 9.266 9.266 95.40 95.40 5.6363 5.6363

13.051 13.051 100.00 100.00 9.266 9.266 95.40 95.40 5.6363 5.6363

 * (0017) SENIOR SCIENCE DEPARTMENT *****
 * (0004) SENIOR HIGH DIVISION *****
 * (0002) SENIOR SCHOOL *****

 * O R G A N I Z A T I O N A L B U D G E T *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(02) FACULTY RANK--02	13.000	.57	89.06	7.410	88.07	4.5074
(05) FACULTY RANK--05	8.471	.07	10.94	593	7.05	.3607
(**) FACULTY TOTALS	12.505	.64	100.00	8,003	95.12	4.8681
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				363	4.31	.2208
(PE) PERMANENT EQUIPT				44	.52	.0268
(BR) BOOK REPAIR				4	.05	.0024
(**) EXPENSE TOTALS				411	4.88	.2500
ADDITIONAL EXPENSES						
*** TOTALS ***		.64		8,414	100.00	5.1181

	COST	PER- CENT	HOURS PRODUCED	PER- CENT	PERCENT TOT HRS	UNIT COST	FTE FACULTY	PER- CENT	PRODUCT. RATIO
COSTS BY COURSE LEVEL									
(TN) GRADE TEN	2.720	32.33	175	42.89	1.31	15.54	.22	34.38	795.45
(EV) GRADE ELEVEN	1.877	22.31	58	14.22	1.44	32.36	.14	21.89	414.29
(TW) GRADE TWELVE	3.817	45.36	175	42.89	1.31	21.81	.28	43.75	625.00
(**) CRSE LVL TOTALS	8,414	100.00	408	100.00	3.06	20.62	.64	100.00	637.50

 * (0018) SENIOR MATH DEPARTMENT DIVISION SCHOOL
 * (0004) SENIOR HIGH SENIOR SCHOOL
 * (0002) SENIOR SCHOOL

 * ORGANIZATIONAL BUDGET *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(02) FACULTY RANK--02	13,100	.14	20.00	1,834	24.84	1.1156
(03) FACULTY RANK--03	12,529	.14	20.00	1,754	23.76	1.0669
(05) FACULTY RANK--05	8,100	.42	60.00	3,402	46.08	2.0694
(**) FACULTY TOTALS	9,586	.70	100.00	6,990	94.68	4.2519
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				348	4.71	.2117
(PE) PERMANENT EQUIPT				42	.57	.0255
(BR) BOOK REPAIR				3	.04	.0018
(**) EXPENSE TOTALS				393	5.32	.2391
ADDITIONAL EXPENSES						
*** TOTALS ***				7,383	100.00	4.4909
COSTS BY COURSE LEVEL						
(TN) GRADE TEN	3,081	41.73	48.72	16.13	.28	682.14
(EV) GRADE ELEVEN	3,099	41.97	33.42	23.66	.28	467.86
(TW) GRADE TWELVE	1,203	16.29	17.86	17.19	.14	500.00
(**) CRSE LVL TOTALS	7,383	100.00	100.00	56.98	.70	560.00

 * (0019) SENIOR PHYS. ED. DEPARTMENT *****
 * (0004) SENIOR HIGH DIVISION *****
 * (0002) SENIOR SCHOOL *****

 * ORGANIZATIONAL BUDGET *****

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(05) FACULTY RANK--05	8.478	.41	100.00	3.476	92.62	2.1144
(**) FACULTY TOTALS	8.478	.41	100.00	3.476	92.62	2.1144
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				246	6.55	.1496
(PE) PERMANENT EQUIPT				29	.77	.0176
(BR) BOOK REPAIR				2	.05	.0012
(**) EXPENSE TOTALS				277	7.38	.1685
ADDITIONAL EXPENSES						
*** TOTALS ***		.41		3.753	100.00	2.2829
COSTS BY COURSE LEVEL						
(TN) GRADE TEN	1.273	33.92	31.05	14.80	.14	34.15
(EV) GRADE ELEVEN	1.233	32.85	46.93	9.48	.13	31.71
(TW) GRADE TWELVE	1.247	33.23	22.02	20.44	.14	34.15
(**) CRSE LVL TOTALS	3.753	100.00	100.00	13.55	.41	100.00
						675.61

A S M A L L A L B E R T A S C H O O L
RESOURCE REQUIREMENTS PREDICTION MODEL

ITER = (01) BASE 1972/73
BASE = (**)

* (0021) SENIOR IND. ARTS DEPARTMENT
* (0004) SENIOR HIGH DIVISION SCHOOL
* (0002) SENIOR

PERCENT OF PERCENT OF
ORGANIZATIONAL BUDGET INSTRUCTIONAL BUDGET

CHAIRMAN	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET	PRODUCT RATIO
FACULTY (BY RANK)							
(06) FACULTY RANK--06	7,786	.29	100.00	2,258	81.90	1.3735	
(**) FACULTY TOTALS	7,786	.29	100.00	2,258	81.90	1.3735	
STAFF (BY CATEGORY)							
EXPENSES (BY TYPE)							
(IM) INST. MATERIALS				220	7.98	.1338	
(PE) PERMANENT EQUIPT				27	.08	.0164	
(BR) BOOK REPAIR				2	.07	.0012	
(**) EXPENSE TOTALS				249	9.03	.1515	
ADDITIONAL EXPENSES				250	9.07	.1521	
*** TOTALS ***				2,757	100.00	1.6770	
COSTS BY COURSE LEVEL							
(TN) GRADE TEN	1,385	50.24	36.69	15.22	.15	51.72	606.67
(EV) GRADE ELEVEN	1,306	47.37	36.29	14.51	.14	48.28	642.86
(TW) GRADE TWELVE	66	2.39	27.02	.99			
(**) CRSE LVL TOTALS	2,757	100.00	100.00	11.12	.29	100.00	855.17


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O R G A N I Z A T I O N A L   B U D G E T  
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** (0022) SECOND LANGUAGE DEPARTMENT DIVISION **  
** (0004) SENIOR HIGH SCHOOL *****  
** (0002) SENIOR *****
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	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUMENTAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(05) FACULTY RANK--05	8,600	.43	100.00	3,698	94.65	2,2494
(**) FACULTY TOTALS	8,600	.43	100.00	3,698	94.65	2,2494
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				185	4.74	.1125
(PE) PERMANENT EQUIPT				22	.56	.0134
(BR) BOOK REPAIR				2	.05	.0012
(**) EXPENSE TOTALS				209	5.35	.1271
ADDITIONAL EXPENSES						
*** TOTALS ***				3,907	100.00	2,3765
COSTS BY COURSE LEVEL						
(TN) GRADE TEN	1,296	33.17	43.75	14,24	.14	32.56
(EV) GRADE ELEVEN	1,234	32.61	33.65	18,20	.14	32.56
(TW) GRADE TWELVE	1,337	34.22	22.60	28,45	.15	34.88
(**) CRSE LVL TOTALS	3,907	100.00	100.00	18,78	.43	100.00
PRODUCT						
PERCENT RATIO						
650.00						
500.00						
313.33						
483.77						

 * (0023) BUSINESS EDUC. DEPARTMENT *
 * (0004) SENIOR HIGH DIVISION *
 * (0002) SENIOR SCHOOL *

 * ORGANIZATIONAL BUDGET *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET	PRODUCT RATIO
CHAIRMAN							
FACULTY (BY RANK)							
(02) FACULTY RANK--02	13,000	.07	15.91	910	18.35	.5535	
(04) FACULTY RANK--04	9,570	.37	84.09	3,541	71.41	2.1539	
(**) FACULTY TOTALS	10,116	.44	100.00	4,451	89.76	2.7075	
STAFF (BY CATEGORY)							
EXPENSES (BY TYPE)							
(IM) INST. MATERIALS							.1131
(PE) PERMANENT EQUIPT				186	3.75	.0128	.0128
(BR) BOOK REPAIR				21	.42	.0006	.0006
(**) EXPENSE TOTALS				208	4.19	.1265	.1265
ADDITIONAL EXPENSES							
*** TOTALS ***				300	6.05	.1825	.1825
				4,959	100.00	3.0165	3.0165
COSTS BY COURSE LEVEL							
(TN) GRADE TEN	1,976	39.85	49.76	19.00	.16	36.36	650.00
(EV) GRADE ELEVEN	1,500	30.25	29.19	24.59	.14	31.82	435.71
(TW) GRADE TWELVE	1,483	29.91	21.05	33.70	.14	31.82	314.29
(**) CRSE LVL TOTALS	4,959	100.00	100.00	77.29	.44	100.00	475.00

 * (0024) FINE ARTS
 * (0004) SENIOR HIGH
 * (0002) SENIOR SCHOOL

ORGANIZATIONAL BUDGET

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(02)	13,000	.07	100.00	910	93.81	.5535
(**) FACULTY TOTALS	13,000	.07	100.00	910	93.81	.5535
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				54	5.57	.0328
(PE) PERMANENT EQUIPT				6	.62	.0036
(**) EXPENSE TOTALS				60	6.19	.0365
ADDITIONAL EXPENSES						
*** TOTALS ***				970	100.00	.5900

	COST	PER-CENT	HOURS PRODUCED	PER-CENT	PERCENT TOT HRS	UNIT COST	FTE FACULTY	PER-CENT	PRODUCT. RATIO
COSTS BY COURSE LEVEL									
(TN) GRADE TEN	965	99.48	55	90.16	.41	17.55	.07	100.00	785.71
(EV) GRADE ELEVEN	5	.52	6	9.84	.05	.83			
(**) CRSE LVL TOTALS	970	100.00	61	100.00	.46	15.90	.07	100.00	871.43

 * ORGANIZATIONAL BUDGET *
 * (0002) SENIOR SCHOOL *

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(01) FACULTY RANK--01	16,594	.18	1.95	2,987	2.81	1.8169
(02) FACULTY RANK--02	13,029	2.98	32.36	38,927	36.49	23.6177
(03) FACULTY RANK--03	12,279	1.19	12.92	14,731	13.85	8,9606
(04) FACULTY RANK--04	9,570	.66	7.17	6,316	5.94	3,8419
(05) FACULTY RANK--05	8,413	3.28	35.61	27,596	25.94	16,7861
(06) FACULTY RANK--06	7,786	.92	9.99	7,163	6.73	4,3571
(**) FACULTY TOTALS	10,599	9.21	100.00	97,620	91.75	59,3803
STAFF (BY CATEGORY)						

EXPENSES (BY TYPE)						
(IM) INST. MATERIALS						
(PE) PERMANENT EQUIPT						
(BR) BOOK REPAIR						
(GL) GRASSLANDS						
(**) EXPENSE TOTALS						
ADDITIONAL EXPENSES						
*** TOTALS ***						

	COST	PER-CENT	HOURS PRODUCED	PER-CENT	TOT HRS	UNIT COST	FTE FACULTY	PER-CENT	PRODUCT. RATIO
COSTS BY COURSE LEVEL									
(JH) JUNIOR HIGH	53,934	50.69	4,764	61.87	35.78	11.32	4.64	50.38	1.026.72
(TN) GRADE TEN	20,420	19.19	1,302	16.91	9.78	15.68	1.78	19.33	731.46
(EV) GRADE ELEVEN	19,042	17.90	905	11.75	6.80	21.04	1.66	18.02	545.18
(TW) GRADE TWELVE	13,001	12.22	729	9.47	5.47	17.83	1.13	12.27	645.13
(**) CRSE LVL TOTALS	106,397	100.00	7,700	100.00	57.83	13.82	9.21	100.00	836.05

A SMALL ALBERTA SCHOOL RESOURCE REQUIREMENTS PREDICTION MODEL

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** ORGANIZATIONAL BUDGET **  
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*** ALL ORGANIZATIONAL LEVELS ***  
  
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	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(01) FACULTY RANK--01	16.594	.18	1.16	2,937	1.82	1.8159
(02) FACULTY RANK--02	13.029	2.98	19.16	38,827	23.62	23.6177
(03) FACULTY RANK--03	12.970	1.19	7.65	14,731	8.96	8.9606
(04) FACULTY RANK--04	9.153	3.61	23.22	33,044	20.10	20.1000
(05) FACULTY RANK--05	8.435	3.79	24.37	31,968	19.44	19.4445
(06) FACULTY RANK--06	7.761	3.80	24.44	29,493	17.94	17.9400
(**) FACULTY TOTALS	9.714	15.55	100.00	151,050	91.88	91.8807
STAFF (BY CATEGORY)						
EXPENSES (BY TYPE)						
(IM) INST. MATERIALS				9,241	5.62	5.6211
(PE) PERMANENT EQUIPT				1,318	.80	.8017
(BR) BOOK REPAIR				1.50	.09	.0912
(GL) GRASSLANDS				1.639	1.00	.0970
(**) EXPENSE TOTALS				12,348	7.51	7.5110
ADDITIONAL EXPENSES				1,000	.61	.6083
*** TOTALS ***				164,398	100.00	100.0000
COSTS BY COURSE LEVEL						
(PR) PRIMARY	29,468	17.92	18.94	11.68	3.16	798.10
(EL) ELEMENTARY	28,533	17.36	23.24	9.22	3.18	972.96
(JH) JUNIOR HIGH	53,934	32.81	35.78	11.32	4.64	1,026.72
(TH) GRADE TEN	20,420	12.42	9.78	15.68	1.78	731.46
(EV) GRADE ELEVEN	19,042	11.58	6.80	21.04	1.66	585.18
(TW) GRADE TWELVE	13,001	7.91	5.47	17.83	1.13	885.13
(**) CRSE LVL TOTALS	164,398	100.00	100.00	12.35	15.55	856.33

* COST PER STUDENT *									

* INSTRUCTIONAL PROGRAM (BY STUDENT LEVEL) *									

* PROGRAM BUDGET *									

* INSTRUCTIONAL PROGRAM (BY STUDENT LEVEL) *									

* PROGRAM BUDGET *									

* INSTRUCTIONAL PROGRAM (BY STUDENT LEVEL) *									

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***** INSTITUTIONAL SUMMARY *****		***** ACTIVITY COSTS *****	
ACTIVITY NAME	ACTIVITY COST	CONSTANT	ENROLL.
1.00 INSTRUCTION PGM			
1.10 GENERAL ACADEMIC	164.398	164.398	
SUB-TOTAL	164.398		
40.00 ACADEMIC SUPPORT			
40.10 LIBRARY SALARIES	5.314	5.314	
SUB-TOTAL	5.314		
50.00 STUDENT SERVICES			
50.30 COUNSEL. + GUID.	5.304	5.304	
SUB-TOTAL	5.304		
60.00 INSTIT. SUPPORT			
60.10 EXEC. MANAGEMENT	14.102	14.102	
SUB-TOTAL	14.102		
63.00 GEN ADMIN SERV			
63.10 ADMIN CLER ASSIS	3.334	3.334	
63.20 INSTR CLER ASSIS	2.552	2.552	
SUB-TOTAL	5.886		
65.00 PHYS PLANT +OPER			
65.10 SALARIES	15.785	15.785	
65.20 UTILITIES	10.349	10.349	
65.30 CARETAKER SUPPLY	1.500	1.500	
65.40 MAINTENANCE	2.358	2.358	
SUB-TOTAL	29.992		
*** TOTAL ***	224.996		

----- ESTIMATING EQUATION COEFFICIENTS -----
 STAFF HOURS FAC-\$ STAFF-\$ BUDGET

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